US007225709B2

(12) **United States Patent**
Liao

(10) **Patent No.: US 7,225,709 B2**
(45) **Date of Patent: Jun. 5, 2007**

(54) **CONTROL DEVICE FOR CONNECTOR FOR SECURING SOCKET THEREON**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 184 days.

(21) Appl. No.: **11/068,021**

(22) Filed: **Feb. 28, 2005**

(65) **Prior Publication Data**

US 2006/0193686 A1 Aug. 31, 2006

(51) **Int. Cl.**
B25B 23/00 (2006.01)

(52) **U.S. Cl.** **81/177.85**; 81/177.2

(58) **Field of Classification Search** 81/177.85, 81/177.2; 403/322.2, 322.3
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,817,476	A *	4/1989	Karge	81/177.85
5,090,275	A *	2/1992	McCann	81/177.85
6,062,112	A *	5/2000	Bonniot	81/177.85
6,209,208	B1 *	4/2001	Marinkovich et al.	30/392
6,523,441	B2 *	2/2003	Lee	81/177.85
6,840,142	B2 *	1/2005	Cheng	81/177.85
2002/0189409	A1 *	12/2002	Lee	81/177.85
2004/0089116	A1 *	5/2004	Cheng	81/177.85
2004/0173060	A1 *	9/2004	Lee	81/177.85

* cited by examiner

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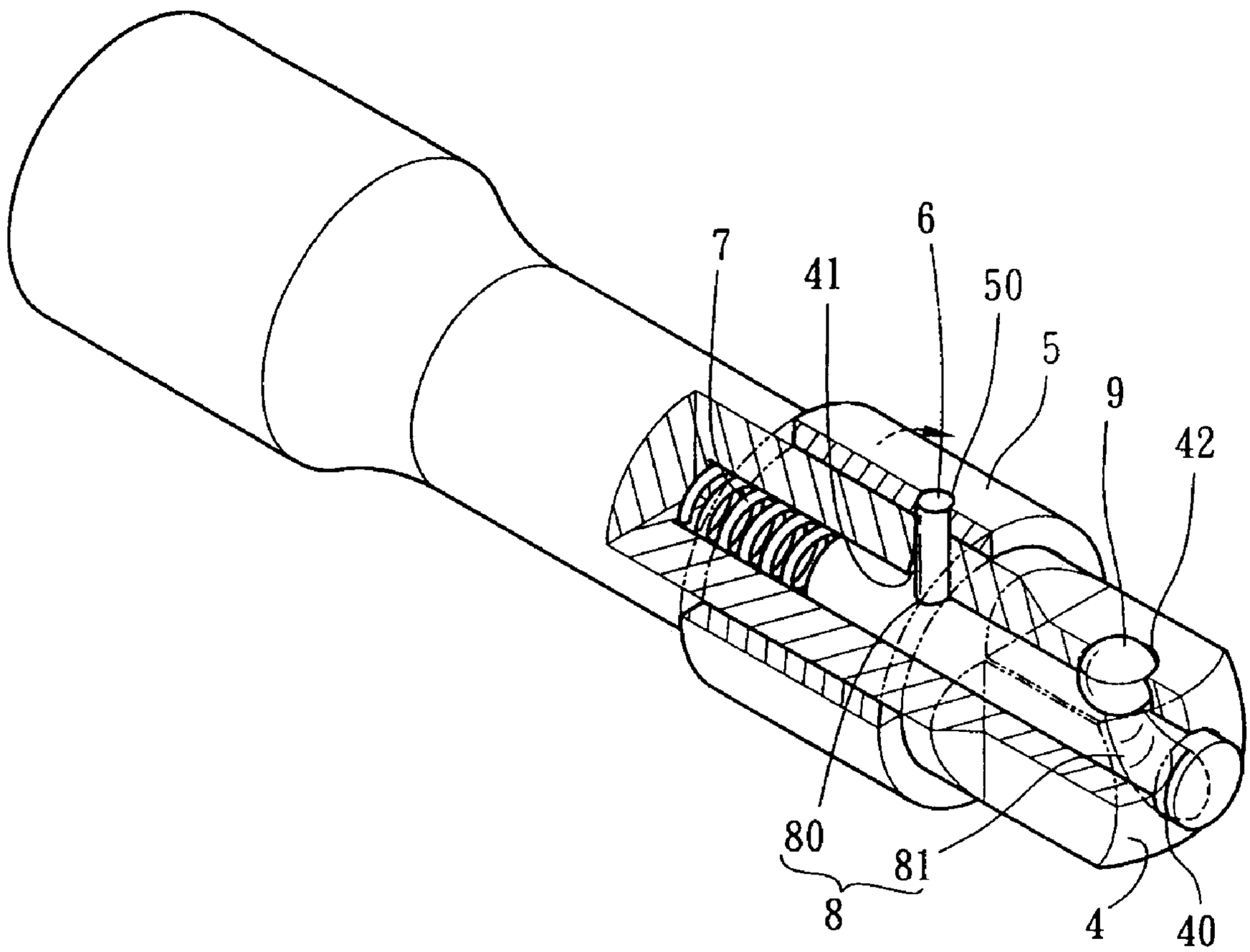
(57) **ABSTRACT**

A connector for easily secure a socket thereon includes an axle rotatably received in an axial recess in an end of the connector and an inclined slot is defined radially in the body. A spring is biased between a first end of the axle and an inside of the axial recess. A guide portion such as a concavity with various depths is defined in a second end of the axle. A ball is movably engaged with a radial hole in the end of the body and operatively in contact with the concavity. A controller is rotatably mounted to the body and a pin extends through a hole in the controller and the inclined slot and is engaged with a receiving hole in the axle. The pin is automatically rotated backward by the spring when the user releases the controller.

3 Claims, 4 Drawing Sheets



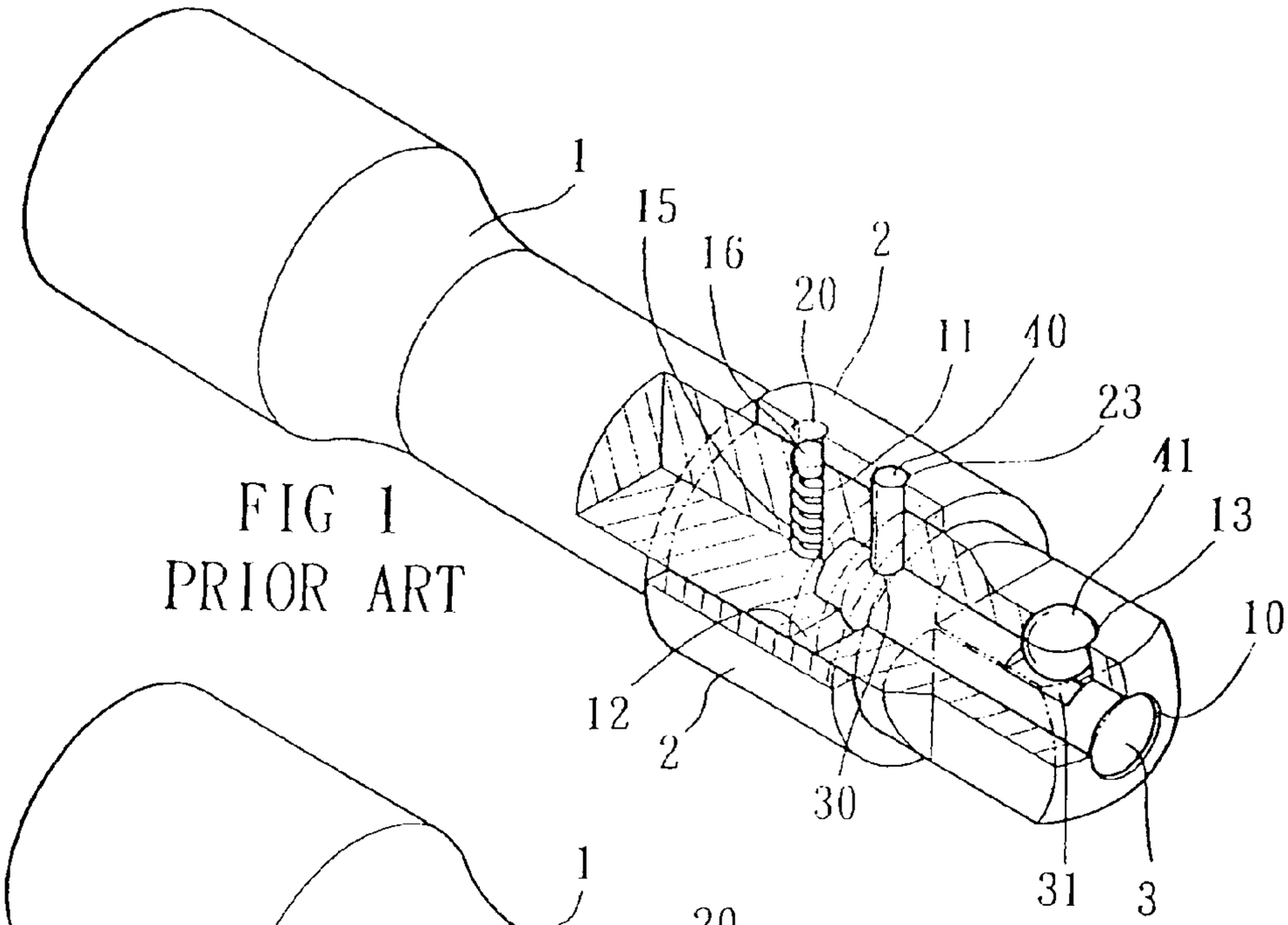


FIG 1
PRIOR ART

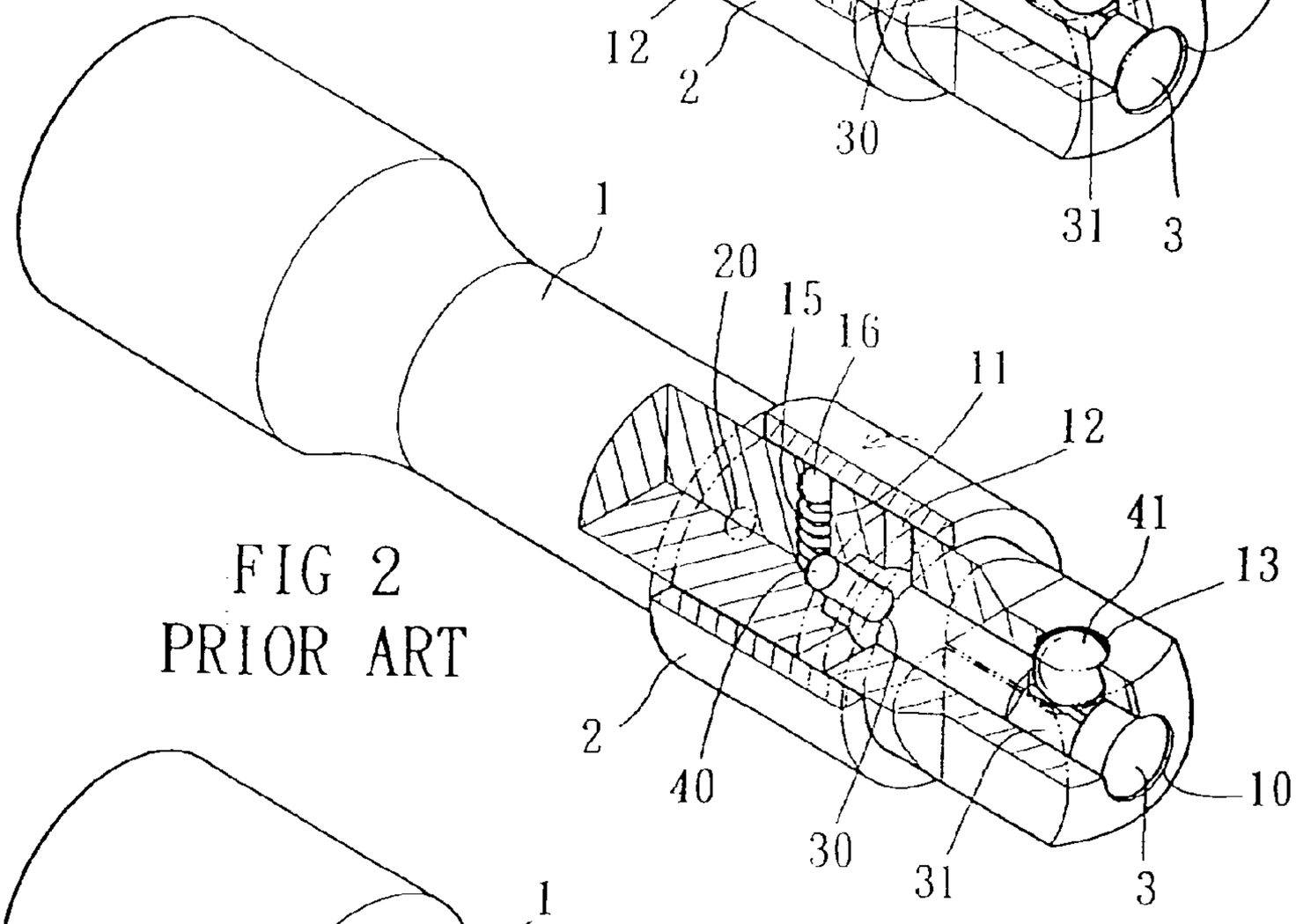


FIG 2
PRIOR ART

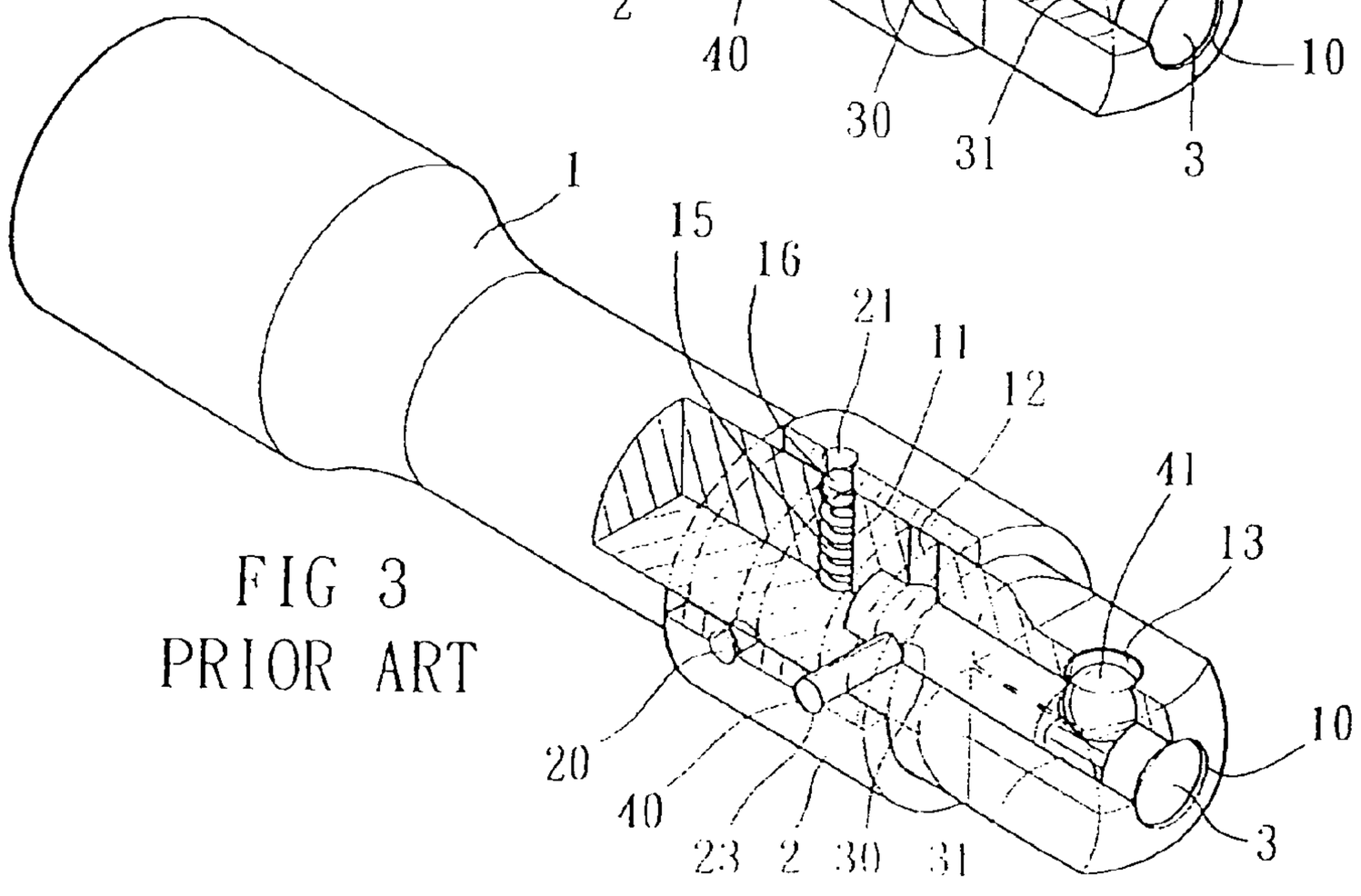


FIG 3
PRIOR ART

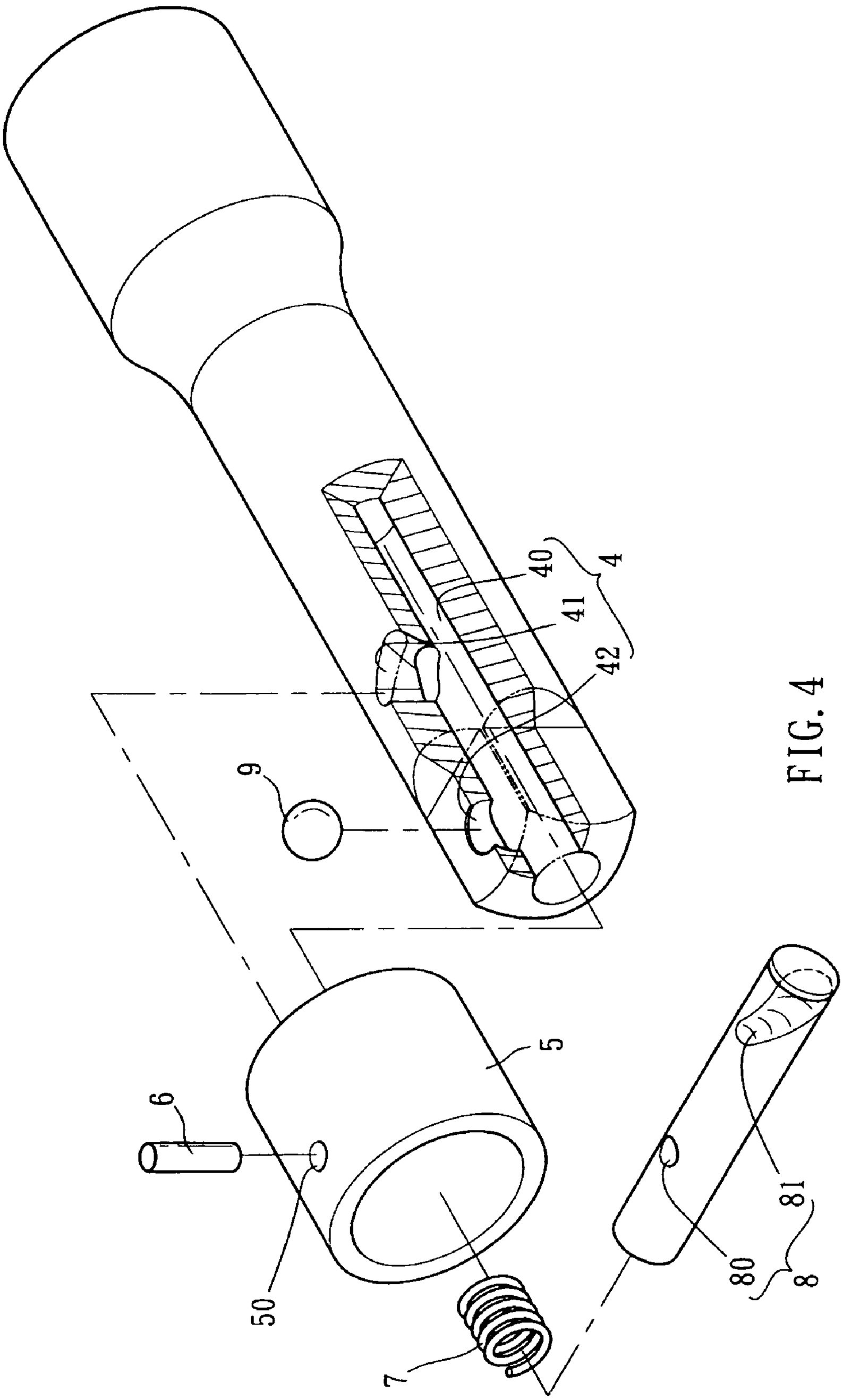


FIG. 4

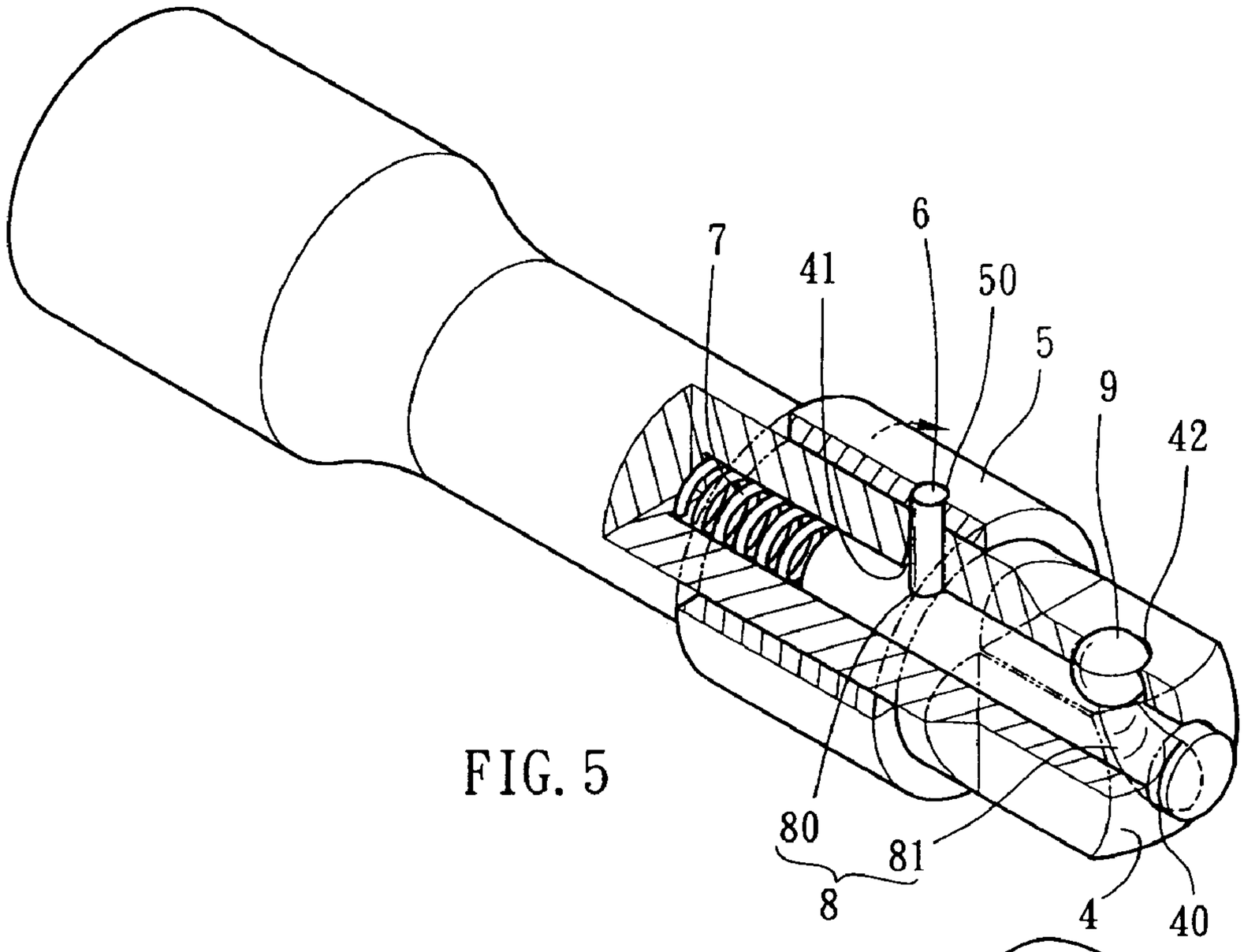


FIG. 5

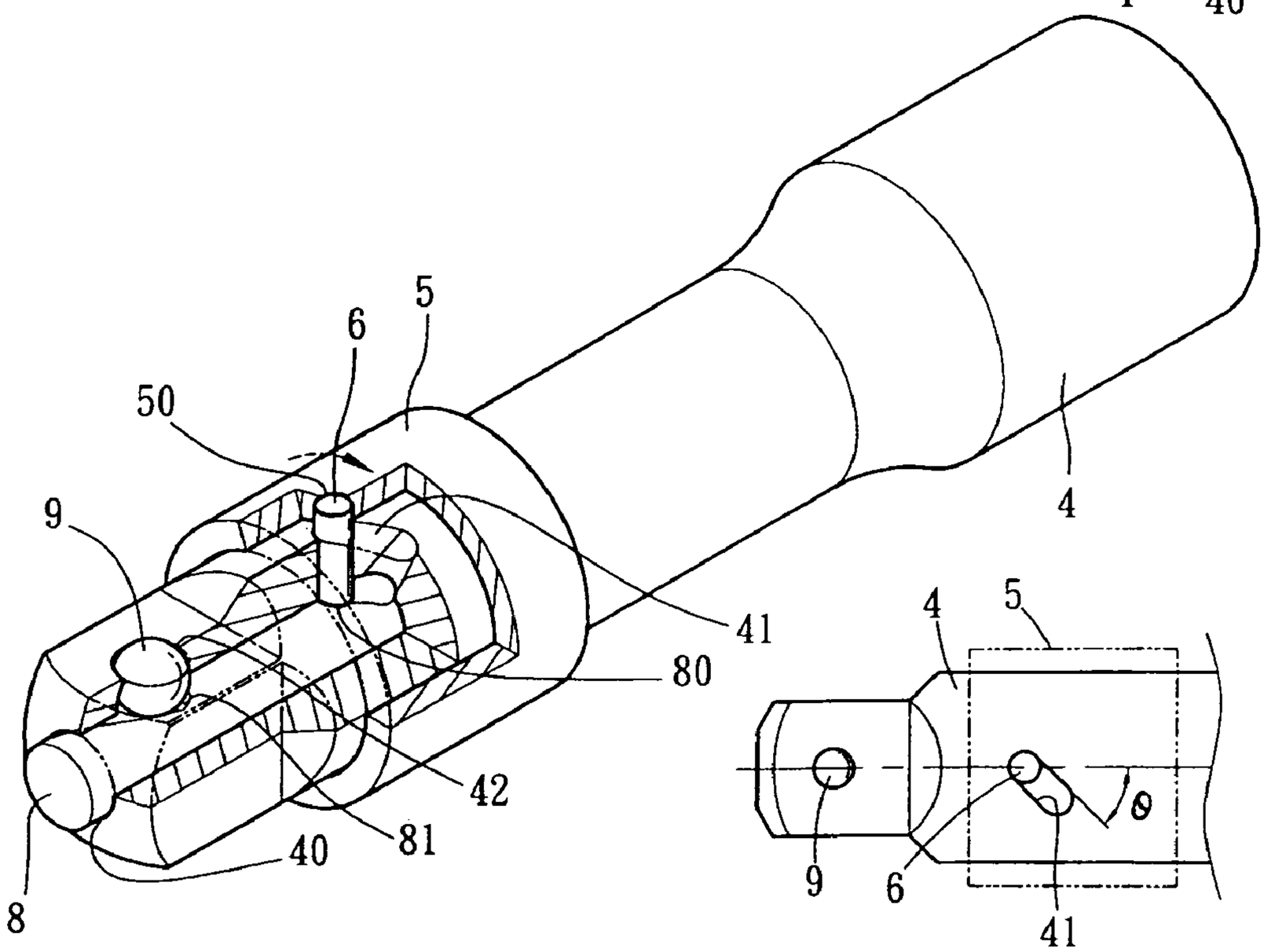


FIG. 6

FIG. 6-1

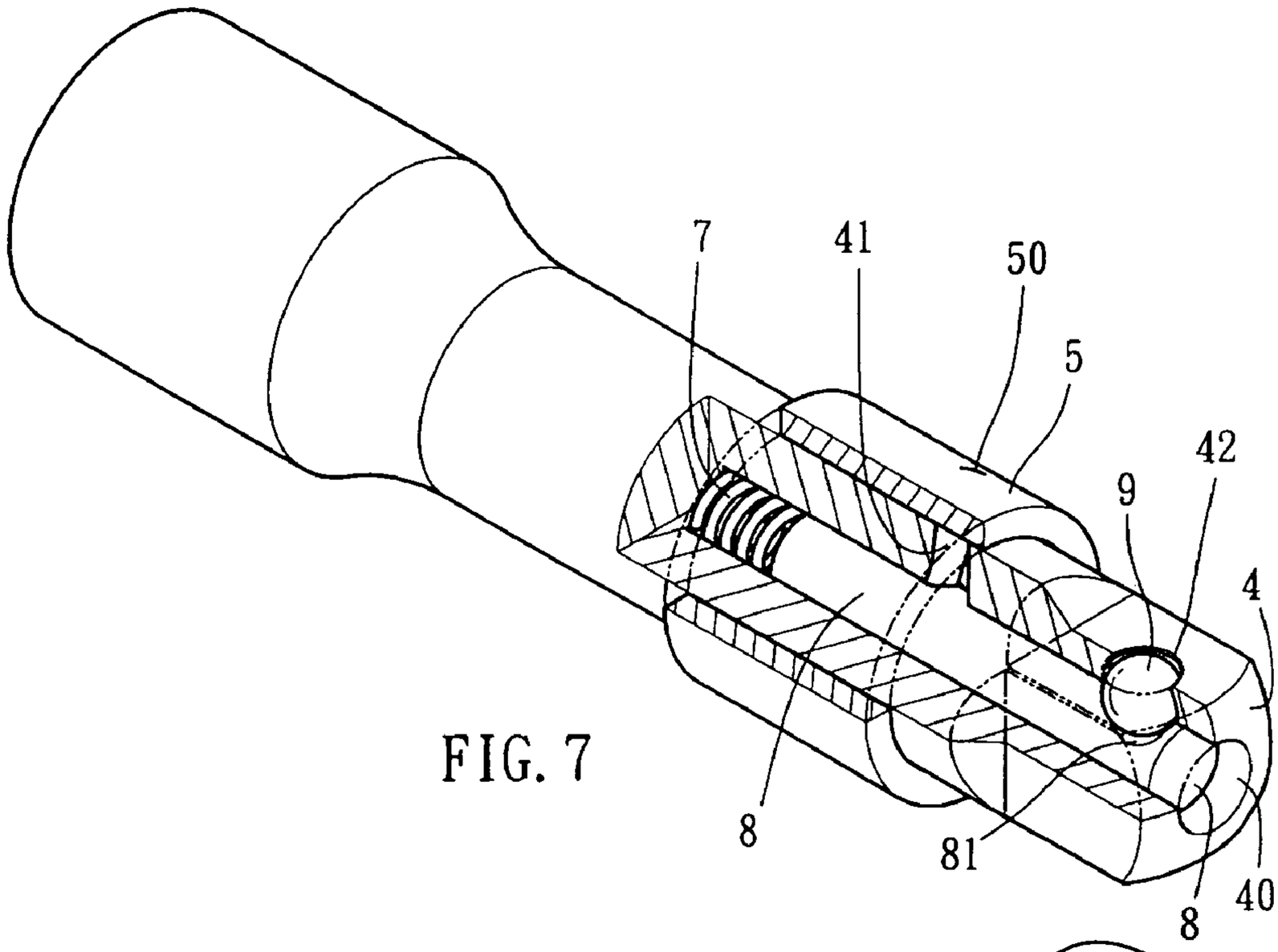


FIG. 7

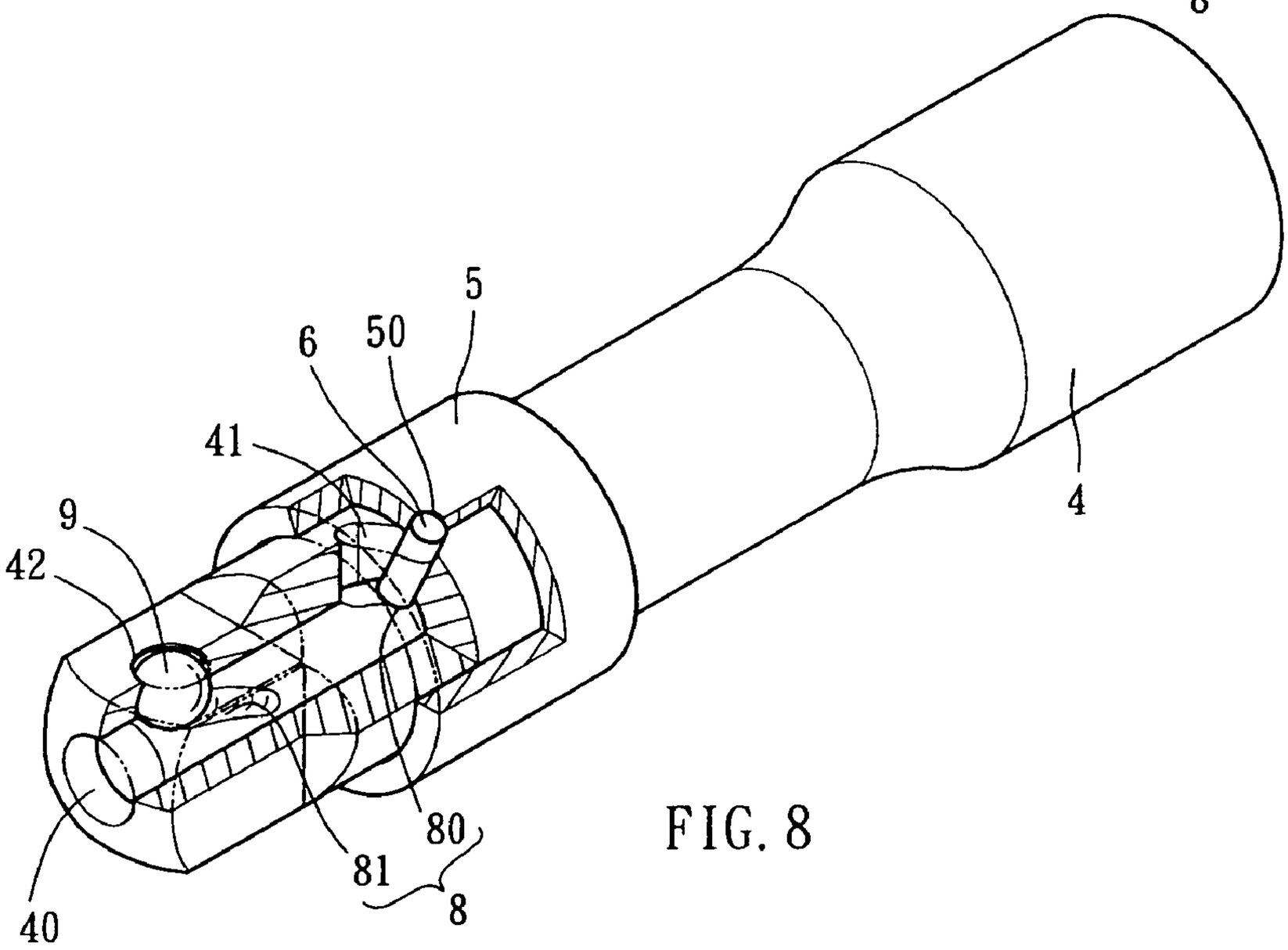


FIG. 8

CONTROL DEVICE FOR CONNECTOR FOR SECURING SOCKET THEREON

FIELD OF THE INVENTION

The present invention relates to a control device of a connector for securing a socket on the connector.

BACKGROUND OF THE INVENTION

A conventional connector **1** for securing a socket (not shown) mounted thereon is disclosed in FIG. **1**, and the connector **1** generally includes a axial recess **10** defined in an end of the connector **1** and a first radial hole **11**, a radial slot **12** and a second radial hole **13** are respectively defined in the connector **1**. A controller **2** is rotatably mounted on the connector **1** and an axle **3** is rotatably extends into the axial recess **10**. A spring **15** and a bead **16** are received in the first radial hole **11** and the bead **16** can be engaged with either one of two positioning holes **20**, **21** defined in the controller **2**. A pin **40** extends through a hole **23** in the controller **2** and is secured to a recess **30** defined radially in the axle **3**. A positioning ball **41** is engaged with the second radial hole **13** and located in corresponding to a concavity **31** defined in the axle **3**. The concavity **31** includes shallow portion and deeper portion. When rotating the controller **2**, the bead **16** is pushed inward and compresses the spring **15**, and the pin **40** moves along the radial slot **12**. The axle **3** is rotated by the pin **40** and the concavity **31** is rotated till the ball **41** is engaged with the deeper portion of the concavity **31** so that the ball **41** is completely merged into the second radial hole **13**. Therefore, a socket (not shown) can be easily removed from or mounted to the end of the connector **1**. The controller **2** has to be rotated in reverse direction till the bead **16** is engaged with another positioning hole **21** and the concavity **31** is rotated to push the ball **41** upward by the shallow portion. The ball **41** extends out from the second radial hole **13** and securely position the socket mounted to the end of the connector **1**. Furthermore, there are too many parts involved in the conventional connector and controller, and a lot of machining steps are required to manufacture the conventional connector and controller.

The present invention intends to provide a controller that is automatically rotated when the user releases the controller and the automatic-return function reduces steps to operate the controller.

SUMMARY OF THE INVENTION

The present invention relates to a connector for connecting sockets and the connector comprises an elongate body having an axial recess defined in an end thereof so as to rotatably receive an axle therein and a guide hole is defined radially in the body and in communication with the axial recess.

A spring is received in the axial recess and biased between a first end of the axle and an inside of the axial recess. A guide portion is defined in a second end of the axle. A ball is movably engaged with a radial hole defined in the end of the body and operatively in contact with the guide portion.

A controller is rotatably mounted to the body and a pin extends through a hole defined through a wall of the controller and the guide hole and engaged with a receiving hole in the axle. The pin is movable in axial direction of the body.

The present invention will become more obvious from the following description when taken in connection with the accompanying drawings which show, for purposes of illustration only, a preferred embodiment in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a conventional connector with a controller mounted thereto;

FIG. **2** shows that the controller of the conventional connector is rotated relative to the connector;

FIG. **3** shows that the controller of conventional connector is rotated such that the ball is completely received in the hole of the connector;

FIG. **4** is an exploded view to show the connector and the controller of the present invention;

FIG. **5** shows a perspective view, partly removed, of the connector and the controller of the present invention;

FIG. **6** shows that the pin is located at an end of the inclined slot;

FIG. **6-1** shows that an acute angle is clamped between the axis of the inclined slot and a longitudinal axis of the body, and

FIGS. **7** and **8** show that the controller is rotated and the pin moves to the other end of the inclined slot, the ball is completely received in the hole.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **4** to **6**, the connector for connecting sockets of the present invention comprises an elongate body **4** having an axial recess **40** defined in an end thereof which generally includes four flat sides and a radial hole **42** is defined in one of the four sides of the end of the body **4** such that a socket (not shown) can be mounted to the end of the body **4** and secured by a ball **9** movably engaged with the radial hole **42**. A guide hole **41** is defined radially in the body **4** and in communication with the axial recess **40**. The radial hole **42** is also in communication with the axial recess **40**.

A spring **7** is received in the axial recess **40** and an axle **8** is rotatably received in the axial recess **40**. The spring **7** is biased between a first end of the axle **8** and an inside of the axial recess **40**. A guide portion **81** is defined in a second end of the axle **8** and the ball **9** movably engaged with the radial hole **42** is operatively in contact with the guide portion **81**. The guide portion **81** can be an inclined surface, a cone-shaped section with different radiuses or a spiral section.

A control device includes a tubular controller **5** which is rotatably mounted to the body **4** and a pin **6** extends through a hole **50** defined through a wall of the controller **5** and the guide hole **41** and is engaged with a receiving hole **80** in the axle **8**, so that when rotating the controller **5**, the axle **8** is rotated therewith. The guide hole **41** is an inclined slot and an acute angle "θ" is clamped between the axis of the inclined slot and a longitudinal axis **40** of the body **4** as shown in FIG. **6-1**. By this inclined slot, the pin **6** is movable in axial direction of the body **4**. The guide hole **41** can also be a spiral hole. It is noted that when the controller **5** is not rotated relative to the body **4** as disclosed in FIGS. **5** and **6**, the spring **7** is not compressed and a part of the ball **9** extends out from the radial hole **42**.

As shown in FIGS. **7** and **8**, when rotating the controller **5**, the pin **6** moves form one end of the inclined slot as shown in FIG. **6** to the other end of the inclined slot as shown in FIG. **8**. This axial movement of the pin **6** moves the axle **8** to compress the spring **7** and the axle **8** simultaneously rotates so as to provide a deeper space to receive the ball **9**

which is then completely received in the radial hole **42**. The socket (not shown) can be easily mounted to the end of the body **4**, or removed from the end of the body **4**. When the user releases the controller **5**, the spring **5** pushes the axle **8** toward the end of the connector **4** and the pin **6** moves back to the position as disclosed in FIG. **6**.

This means that the user needs not to rotate the controller after the socket is mounted to the end of the body **4**. Besides, the structure is simplified when compared with the conventional connector and controller, so that the connector and controller of the present invention are easily to be manufactured at lower cost.

While we have shown and described the embodiment in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.

What is claimed is:

1. A connector for sockets, comprising:

an elongate body (**4**) having an axial recess (**40**) defined in an end thereof and a guide hole (**41**) defined radially in the body (**4**) and being in communication with the axial recess (**40**), a radial hole (**42**) defined in the end of the body (**4**) and being in communication with the axial recess (**40**);

a spring (**7**) received in the axial recess (**40**) and an axle (**8**) rotatably received in the axial recess (**40**), the spring (**7**) biased between a first end of the axle (**8**) and an inside of the axial recess (**40**), a guide portion (**81**) defined in a second end of the axle (**8**), a ball (**9**) movably engaged with the radial hole (**42**) and being operatively in contact with the guide portion (**81**), and

a controller (**5**) rotatably mounted to the body (**4**) and a pin (**6**) extending through a hole (**50**) defined through a wall of the controller (**5**) and the guide hole (**41**) and being engaged with a receiving hole (**80**) in the axle (**8**), the pin (**6**) being movable in axial direction of the body (**4**).

2. The connector as claimed in claim **1**, wherein the guide portion (**81**) is a spiral section.

3. The connector as claimed in claim **1**, wherein the guide hole (**41**) is spiral hole.

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